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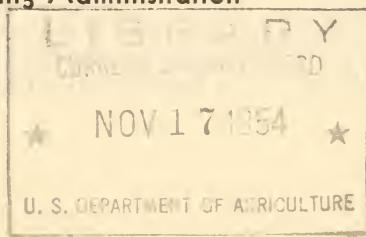
352

Feeding molasses to livestock



UNITED STATES DEPARTMENT OF AGRICULTURE
Production and Marketing Administration

Leaflet No. 352



Feeding Molasses to Livestock

Prepared in the Sugar Branch, Production and Marketing Administration

In recent years, there has been a marked increase in the quantity of molasses fed to livestock. The use of this product as an ingredient in feed could be materially expanded, thereby benefiting both livestock feeders and molasses producers. The information in this leaflet is based on molasses feeding tests car-

ried out by State agricultural experiment stations; the Bureau of Animal Industry, U. S. Department of Agriculture; marketing research studies made by the Sugar Branch; and experiences of many farmers who feed molasses to their livestock.

Why Feed Molasses?

Molasses makes roughage more palatable. Its addition to feed induces cattle to eat roughage they would normally refuse. This reduces waste and makes more feed available.

than a bushel of No. 3 yellow corn. During September 1953 molasses was \$1.07 cheaper per bushel of corn equivalent.

Cuts Feed Costs

Molasses can be substituted, in livestock feed, for up to one-third of the more expensive carbohydrate ingredients, such as corn. Six and a half gallons of molasses has approximately the same feed value as a bushel of yellow corn. When this quantity of molasses can be bought for less than a bushel of corn, then it pays to feed molasses.

Other Reasons

There are other reasons, too. Molasses serves as a binding agent in mixed feeds and it reduces the dust in them.

On a feed-value basis, molasses has been less expensive than corn in each of the last 15 years except 1943 and 1951. A comparison of the average New York wholesale prices for corn and molasses in 1952 shows that molasses was 69.8 cents cheaper on an equivalent feeding-value basis



What Is Feed Molasses?

Feed molasses is a byproduct of the sugar, citrus, and corn products industries and is considered inedible to the extent that it is not generally usable as food for humans. However, molasses is rich in energy value, highly palatable, and possesses other qualities that make it an excellent feed for animals.

The four types of feed molasses are: Blackstrap (cane molasses), beet, citrus, and hydrol molasses. **Blackstrap**, which accounts for the largest volume of molasses used in livestock feeding, is a byproduct from the manufacture of raw sugar from sugarcane and the refining of raw sugar. **Beet molasses** results

from the production of beet sugar. The press water from citrus fruit juice production becomes **citrus molasses** after it is processed through evaporators. **Hydrol** (corn molasses) is a byproduct from the manufacture of refined corn sugar (dextrose).

All four types are rich in carbohydrates and contain such essential minerals as iron and calcium. Molasses also is a good source of niacin and pantothenic acid which are needed in swine and poultry rations.

Average quantities of total sugars, protein content, and percentage of Brix solids of the four types of molasses are as follows:

Type of molasses	Percentage of total sugars	Percentage of protein	Percentage of Brix solids ¹
	Percent	Percent	Percent
Cane blackstrap	48-56	1-3	79.5-86
Beet	48-52	6-10	80-85
Hydrol	60-64	(²)	75
Citrus	41-43	3-4	70-73

¹ Brix refers to a measure of density of a sugar solution.

² Less than 1 percent.

One gallon of hydrol, cane, or beet molasses weighs 11.7 pounds, or 171 gallons per short ton (at a density of 79.5° Brix). Citrus molasses has an average density of 71° Brix, and weighs 11.3 pounds per gallon or 177 gallons per short ton.

Cane molasses (blackstrap) has a sweet taste and odor, and is readily eaten by all kinds of livestock. Beet molasses is similar to cane molasses. Hydrol (corn molasses) is higher in sugar content but it does not have the sweet odor of cane molasses. Citrus molasses also differs from cane molasses in odor and taste. However, animals quickly become accustomed to hydrol or citrus molasses and these are excellent carbohydrate feeds.

Most molasses is sold in liquid form, but molasses products in other forms are on the market. These

are mostly dried molasses products and are derived chiefly from cane molasses and hydrol. Various carrying agents, such as corn-oil cake meal and bagasse pith, are used. These products are more expensive than liquid molasses but are easier to handle and mix.

New Products

In addition to dried and liquid molasses there is now an "ammoniated molasses" product available in the New Orleans area. The manufacturers of this product state that it increases the nitrogen content of the molasses, and therefore its protein equivalent, and that it flows more rapidly than blackstrap. Molasses containing urea, which also increases its nitrogen content, is also on the market.

How May Molasses Be Fed and in What Amounts?

Direct Feeding

When cane molasses is fed free choice, beef cattle normally consume about 4 to 6 pounds ($\frac{1}{3}$ to $\frac{1}{2}$ gallon) daily per head. Beet and citrus molasses when fed free choice to



cattle will normally be consumed at a rate of about 5 to 6 pounds ($\frac{2}{5}$ to $\frac{1}{2}$ gallon) daily per head. When fed in recommended amounts, molasses does not produce any harmful laxative effects. Molasses frequently is beneficial when other feeds are constipating. Suggested amounts of beet molasses for animals accustomed to it are as follows:

Animal	Daily ration per 1,000 pounds live weight Pounds
Feeder cattle-----	4 to 6
Dairy cattle-----	2.5 to 3
Sheep-----	3 to 5
Horses, heavy-----	4
Horses, light-----	2.5
Feeder pigs-----	5 to 10

It is recommended that animals be accustomed gradually to beet molasses. Breeding animals should be given smaller allowances than those being fattened. The amount of beet molasses should be materially reduced 6 weeks before the young are born.

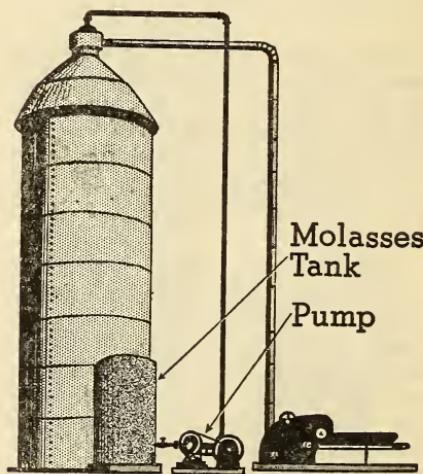
In Mixed Feeds

In addition to adding palatability, settling dust, and serving as a binder, molasses may replace other carbohydrates in mixed feeds. Such replacement by blackstrap molasses may be as high as the following amounts:

Animal	Percentage of molasses per total ration Percent
Beef cattle-----	20
Dairy cattle-----	20
Work stock-----	15
Sheep-----	10
Swine-----	20
Poultry-----	6

As A Preservative

Molasses serves well as a grass-silage preservative. It is an inexpensive preservative and, in addition, at least 75 percent of the



feeding value of the molasses is retained in the silage. The following tabulation includes the quantitites of molasses that are sufficient to accomplish the proper degree of fermentation in silage.

Suggested quantities of molasses to be used in making silages

Silage	Quantity of molasses (per ton of crop ensiled)	
	Pounds	Gallons
Legumes, fresh green:		
Alfalfa, red clover-----	80	6. 8
Soybeans, Ladino clover-----	100	8. 5
Legumes, wilted: All crops ¹		
Legumes and grasses mixed, before grass is headed out:		
Fresh green-----	80	6. 8
Wilted ¹ -----	60	5. 1
Legumes and grasses mixed, after grass is headed out:		
Fresh green ¹ -----	60	5. 1
Wilted-----	None	None
Grasses and cereals before heading out:		
Fresh green-----	60	5. 1
Wilted ¹ -----	40	3. 4
Grasses and cereals after heading out:		
Fresh green ¹ -----	40	3. 4
Wilted-----	None	None

¹ Preservatives may be omitted when the silos are smooth and airtight, and when recommended methods for filling silos are carefully followed.

Poured on Roughages

Molasses is best handled by diluting it with one or two parts of water and pouring the mixture on roughages. It should be spread evenly on top of the roughage.

Pelleted With Other Feeds

The exact percentage of molasses to be used depends on the type of

processing equipment and the type of carrier used. Pellets may contain from 15 to as high as 35 percent of molasses. At the higher level, however, the pellets sometimes disintegrate quickly when wet.

Most manufacturers guarantee that the lubricants used for the pelleting machinery contain no highly chlorinated naphthalene—a chemical that causes X-disease in cattle. Be sure you obtain such a guarantee.

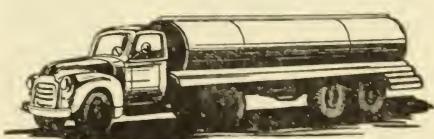
With Dried Beet and Citrus Pulp

Beet pulp when combined with molasses and then dried, forms a molasses-beet pulp which is palatable, bulky, slightly laxative, and which will keep well in storage. Up to 30 percent of beet molasses may be satisfactorily dried with the beet pulp. This pulp is rich in carbohydrates and the protein content is about 9 percent. Dried molasses-beet pulp is used chiefly for feeding dairy cattle. Citrus pulp may be combined with as much as 30 percent of citrus molasses. This type of feed has about the same value as dried beet pulp and is consumed mostly by dairy cattle in Florida and neighboring States, as well as in parts of the Northeastern States.

Where To Buy Molasses

For users requiring only small amounts of molasses, the 55-gallon drum unit is available in major feed markets throughout the country. Some distributors offer molasses in 5- and 10-gallon tins or will fill individually owned containers. The needs of farmers and small feed mixers may be met by tank-truck deliveries. These deliveries to individual farmers and feed mixers are usually in lots of about 2,000 to 3,000 gallons, but in some cases

lesser quantities may be purchased. Terminals from which tank-truck deliveries are made usually serve an area within 150 to 200 miles. Molasses may be obtained by tank truck in the Gulf States, the North



Central States, Midwest, States along the eastern seaboard, and the west coast.

The most economical unit of purchase is a tank-car lot (6,000 to 10,000 gallons). Deliveries of tank-

car lots of molasses are made to all parts of the country and may be ordered from distributors or brokers at major terminals and at a few other points, as follows:

CANE BLACKSTRAP

Southeast

Norfolk, Va.
Savannah, Ga.
Jacksonville, Fla.
Clewiston, Fla.
Port Everglades, Fla.
Fellsmere, Fla.
Nashville, Tenn.
Knoxville, Tenn.
St. Louis, Mo.

Gulf area

New Orleans, La.
Mobile, Ala.
Houston, Tex.
Beaumont, Tex.
El Paso, Tex.
Various production points in Louisiana.

Northeast

Boston, Mass.
Buffalo, N. Y.
Albany, N. Y.
New York, N. Y.
Philadelphia, Pa.
Baltimore, Md.

West coast

Los Angeles, Calif.
Richmond, Calif.
Stockton, Calif.
Portland, Oreg.
Seattle, Wash.

North Central

Chicago, Ill.
Savage, Minn.
Muscatine, Iowa
Cincinnati, Ohio

BEET MOLASSES

Various production points within the following areas:

Western and southern California
Southern Idaho and northern Utah
Northern Colorado and western Nebraska
Michigan, northern Ohio, and eastern Wisconsin
Northern Wyoming and southern Montana
Southern Minnesota and northern Iowa

and at the following points:

Toppenish, Wash.	Belle Fourche, S. Dak.	Garden City, Kans.
Missoula, Mont.	Grand Island, Nebr.	Nyssa, Oreg.

CITRUS MOLASSES

Production points in Florida:

Auburndale	Frostproof	Ocala
Bartow	Haines City	Plymouth
Dade City	Lake Wales	Winter Garden
Dunedin	Leesburg	

HYDROL

Kansas City, Kans.	Pekin, Ill.	Chicago, Ill.
Argo, Ill.	Clinton, Iowa	

NOTE.—Your County Agent or local feed dealer can help you to locate a supply source.

In the Northeast, two large cooperatives have developed a distribution system through member stores or warehouses. Tank-truck deliveries are made to these points where farmers may bring their own containers for refilling or bring their own feed for mixing. This service reduces container and handling charges for molasses sold in small lots.

At the local feed store, feed mill, or co-op, users may be able to buy either or both liquid and dried molasses in small quantities. In many parts of the country, feed mixers and small feed mills will add molasses to mixed feeds or fill the buyer's container at the mill or store. Individually owned containers may be filled also at most of the major terminals.

How Much Does It Cost?

The average price for molasses in tank-car lots at New Orleans during the first 6 months of 1953 was 10.7 cents per gallon. The New York price was 12 cents.

Prices for feed molasses delivered by tank truck are usually a few cents higher per gallon than the tank-car price at the nearest terminal. The delivered price for molasses in tank trucks depends on the quantity delivered and the distance from the storage terminal. Tank-truck delivery affords the cheapest means of obtaining molasses for users who do not require large enough quantities to justify tank-car deliveries. Tank-truck deliveries in several areas are competitive with tank-car deliveries.

The price of molasses in drums or barrels is higher than in any other form of delivery because of increased handling costs and the small unit of purchase. A user of small quantities may reduce his costs for molasses somewhat by furnishing his own containers and picking up molasses at the dealer's place of business.

(A weekly market report may be obtained from the Sugar Branch, PMA, U. S. Department of Agriculture, Washington 25, D. C. This report provides current market information on all types of molasses at all major terminals in the United States. Included in the report are weekly molasses prices, supply and demand conditions both in the United States and in foreign countries, and market information on products related to molasses.)

What Equipment Is Needed on the Farm?

In order to purchase molasses in tank-car lots (6,000 to 10,000 gallons), storage tanks are necessary at a rail siding. Storage capacity should be large enough to allow for the receipt of a carlot before the tank has been emptied.

Deliveries by tank truck may range as high as 3,000 gallons. Although some truckers prefer not to make deliveries of less than 1,000 gallons, others will deliver as little as 500 gallons, but such a purchase is less economical to the buyers. As in storage tanks for tank-car deliveries, tanks to receive tank-truck shipments generally should be larger than the unit of delivery. These tanks should be located near an all-weather road and elevated high enough to permit gravity flow into smaller distributing tanks.

For more detailed information on storage tanks, the individual tank manufacturers should be contacted. A list of these manufacturers may be obtained by writing the Sugar Branch. The molasses distributor located nearest you would be glad to furnish advice and assistance in

establishing handling facilities to suit your needs.

Approximate prices for various sizes of tanks are (1953) as follows:

Capacity Gallons	Gage	Weight Pounds	Price ¹ Dollars
220-----	14	200	40
550-----	12	530	75
1,034-----	10	1,050	150
1,500-----	$\frac{5}{16}$ "	1,500	200
3,000-----	$\frac{3}{16}$ "	2,765	370
5,300-----	$\frac{1}{4}$ "	5,290	740
10,000-----	$\frac{1}{4}$ "	7,806	1,030

¹ These prices do not include delivery or installation costs.

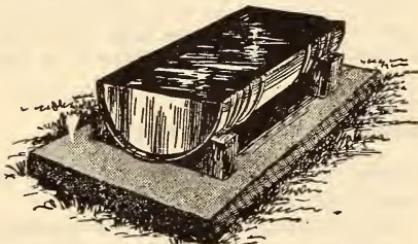
A 500-gallon distributing tank may be mounted on a four-wheel-drive jeep for pasture distribution to feeding troughs. For users of large quantities this practice materially reduces labor requirements for on-farm handling.

Smaller distributing tanks (250 gallon capacity) mounted on a single-axle trailer serve well for molasses distribution to pastures. The cradle for this tank should be elevated enough to permit gravity flow through a bottom outlet. These trailer tanks may be towed by jeep, truck, or tractor to feeding troughs.

In cold weather a molasses pump mounted with the trailer tank facilitates handling.

In order to make one feeding trough or self-feeding tank serve a dual purpose, it may be situated at the juncture of separate fenced lots, thus reducing the number of tanks required and the amount of handling of the molasses.

There are many methods for the self-feeding of molasses. Small quantities of liquid molasses may be fed quite easily from 55-gallon drums which have been cut in half from end to end and mounted on wooden blocks. (Care should be taken to smooth the edges of the metal.)



A drum of molasses may be inverted in a shallow tank or tight box, with the open end down (similar to a poultry waterer). The open bung permits the molasses to flow out and maintain its level as it is consumed.

A simple tightly constructed wooden trough serves well as a self-feeder into which molasses may be poured from drums or piped from storage tanks. To prevent wastage when molasses is being fed in this manner, floats should be placed on top of the molasses. These may be made of narrow boards spaced so as to permit the animals to lick up the molasses between the boards. Floats may also be made of joined boards with holes of 2 or 3 inches in diameter bored through them.

Skid tanks of 200- to 500-gallon capacity offer an advantage over

stationary tanks in that they may be moved from one location to another. These are tanks mounted on a framework having dual flat runners along the bottom.

Some further developments of the self-feeder have been through the use of an oval-shaped trough about 12 inches deep, 12 feet in length, and 1½ feet wide. Instead of the animals licking molasses directly from the trough, this type of self-feeder has a 4-inch pipe acting as a roller mounted at both ends and permitted to revolve freely while immersed about halfway into the molasses. This trough has a cover extending from the sides to within 1 inch of the roller which allows the animals to see the molasses and get it by licking the roller.

Before animals become accustomed to self-feeding, the molasses should be fed in limited quantities. Daily intake may be gradually increased up to amounts recommended for various animals.

For self-feeding larger amounts of molasses (several tons) 2- to 2½-inch float valves may be connected directly to the line coming from the storage tanks. This arrangement allows the use of several troughs at one time and eliminates the handling of drums, as the molasses can be delivered directly into the tanks where tank-truck deliveries are available. The float valves may be installed at one end of the trough so as to maintain a thin layer (about 1 inch) of molasses over the feeding part of the trough.

A list of manufacturers of molasses-mixing equipment may be had by writing the Sugar Branch, PMA, U. S. Department of Agriculture, Washington 25, D. C.

Copies of a "Bibliography on the Use of Molasses in Livestock Feeding," (A. H. D. 151) may be obtained from the Bureau of Animal Industry, U. S. Department of Agriculture, Washington 25, D. C.

Washington, D. C.

October 1953

